Identification of Emerging Technologies
Source Category: Large Water Heaters and Small Boilers

Pollutant: NOx

Description of Emerging Technology	Status	Source	Comments
Nearly every manufacturer of small boilers in the Los Angeles Basin offers for sale at least one model that meets or exceeds the rule requirements. Lochinvar Corporation offers boilers in the size range of 300,000 to 990,000 Btu /hr which emit less than 10 ppm NOx. Fulton Boiler offers boilers in the size range of 400,000 to 1,260,000 Btu/hr which emit less than 20 ppm NOx. One out-of-basin manufacturer offers a boiler which meets 9.9 ppm NOx. Lowering peak flame temperature and reducing the amount of air flowing to the burner are methods involved in NOx control for small boilers. To accomplish this , manufacturers add a fan to force combustion air into the unit. A fan provides for better mixing of the air and fuel and also better control of the amount of air. Reducing excess air and other low-NOx strategies also improve fuel efficiency. Fuel savings of 10 to 13 percent are reported by the California Energy Commision for low-NOx conversions. Reducing peak flame temperature is accomplished by burner design, usually by limiting the amount of air in the immediate vicinity of the flame or by spreading the flame out across a surface so that it burns cooler. Both of these concepts are in operation today from manufacturers of units in the subject size range of South Coast Rule 1146.2. In the power premix design, air and fuel are mixed external to the boiler. A fan is used to push air into the unit and the gas is mixed in the air pipe upstream of the burner. The combined air and fuel mixture is then combusted on a porous substrate that acts as a burner and serves to hold and stabilize the flame. The porous substrate can be a supported metal or ceramic matrix or a perforated ceramic tile. This design controls the amount of air in the mixture and by distributing the flame more broadly across a surface, lowers peak flame temperature. Low-NOx technology has been available for residential and commercial water heaters prior to 1982. All new residential units less than 75,000 Btu/hr have been required to meet a Nox standard of 50 ppm since 1984. Some of the burner technologies available to meet this Nox level are radiant, two-stage, non-aerated, and ribbon. These technologies work by limiting peak flame temperature and reducing the amount of air flowing to the burner.	Natural gas low NOx boilers and burners are commercia lly available.	South Coast AQMD, Final Staff Report for Proposed Rule 1146.2 - Emissions of Oxides of Nitrogen from Large Water Heaters and Small Boilers , December 12, 1997 Lochinvar Corporation Sales Brochure, Nashville, TN, February 1996 Fulton Sales Brochure, Pulachie, NY California Energy Commission, Small Business Energy Loan Program, BR Laboratories, Inc, Demonstration of Low-NOx Ceramic Fiber Burners, May 1993	

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